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setting a length of a train of alpha pulses of a gradient echo sequence specific to the user-related imaging parameters; and

applying the gradient echo sequence to selectively acquire data acquisition from the targeted tissue.

- 2. (Currently Amended) The method of claim 1 wherein the step of determining setting the length of a train of alpha pulses is carried out on-the-fly.
- 3. (Currently Amended) The method of claim 1 wherein the step of determining setting the length of a train of alpha pulses includes the step of determining an optimal number of RF pulses to be carried out after a spectrally selective inversion pulse.
- 4. (Original) The method of claim 3 wherein the spectrally selective inversion pulse is constructed to have a flip angle sufficient to drive longitudinal magnetization of the suppressed tissue into a steady state condition prior to application of a subsequent alpha pulse.
- 5. (Original) The method of claim 4 further comprising the step of applying another spectrally selective inversion pulse at TR, wherein the another spectrally selective inversion pulse has a flip angle of 180°.
- 6. (Original) The method of claim 3 wherein the step of applying includes applying the series of tissue suppression pulses immediately after the spectrally selective RF pulse.
- 7. (Original) The method of claim 1 further comprising the step of placing, at a center of k-space, data corresponding to a gradient echo substantially corresponding to a null point of the suppressed tissue.
- 8. (Original) An MRI apparatus to acquire gradient echo data comprising:
  a magnetic resonance imaging (MRI) system having a plurality of gradient
  coils positioned about a bore of a magnet to impress a polarizing magnetic field and an

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RF transceiver system and an RF switch controlled by a pulse module to transmit RF signals to an RF coil assembly to acquire MR images; and

a computer programmed to:

- (A) determine a null point of tissue to be suppressed;
- (B) determine a time interval for longitudinal magnetization of the tissue to recover to the null point; and
- (C) from the time interval, determine a number of alpha pulses to be applied after each inversion pulse of a gradient echo pulse sequence.
- 9. (Original) The MRI apparatus of claim 8 wherein the computer is further programmed to place at a center of k-space an echo substantially corresponding to the null point of the suppressed tissue.
- 10. (Original) The MRI apparatus of claim 8 wherein a first inversion pulse has a flip angle less than 180° and subsequent inversion pulses have a flip angle of 180°.
- 11. (Original) The MRI apparatus of claim 10 wherein the computer is further programmed to:

determine an arccosine of a ratio between steady-state magnetization and thermal equilibrium magnetization; and

set the flip angle of the first inversion pulse to the arccosine.

- 12. (Original) The MRI apparatus of claim 8 wherein the computer is further programmed to apply one of a 2D gradient echo acquisition and a 3D gradient echo acquisition.
- 13. (Original) The MRI apparatus of claim 8 wherein the computer is further programmed to carry out acts (A) (C) on-the-fly.
- 14. (Original) The MRI apparatus of claim 13 wherein the computer is further programmed to identify a set of user inputs identifying receiver bandwidth, x-resolution, TR, T<sub>1</sub> of the tissue, flip angle, y-resolution, and number of slices.

15. (Original) A pulse sequence for gradient echo acquisition, the pulse sequence comprising:

a first TR period and at least a second TR period;

a first inversion pulse having a flip angle less than 180° played out during the first TR period;

a second inversion pulse having a flip angle of 180° played out during each subsequent TR period; and

a number of RF alpha pulses played out during each TR period wherein a portion of the alpha pulses is played out prior to zeroing of longitudinal magnetization of a tissue targeted for evaluation.

- 16. (Original) The pulse sequence of claim 15 wherein the flip angle of the first inversion pulse is set to a value sufficient to immediately drive suppressed transverse magnetization of the tissue to steady-state.
- 17. (Original) A computer readable storage medium having a computer program to implement a gradient echo acquisition and representing a set of instructions that when executed by a computer causes the computer to:

identify a set of user-selected imaging parameters for an imminent MR scan of a targeted tissue;

on-the-fly, determine a flip angle of a spectrally selective inversion pulse to be applied to immediately drive suppressed magnetization of the targeted tissue to steady-state; and

on-the-fly, determine a number of alpha pulses to be applied after the spectrally selective inversion pulse such that alpha pulses are applied before and after longitudinal magnetization of the targeted tissue reaches zero.

- 18. (Original) The computer readable storage medium of claim 17 wherein the set of instructions further causes the computer to reset the flip angle of the spectrally selective inversion pulse to 180° after expiration of a first TR period.
- 19. (Original) The computer readable storage medium of claim 17 wherein the set of instructions further causes the computer to fill k-space such that an echo substantially corresponding to a null point of the targeted tissue fills a center of k-space.

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20. (Original) The computer readable storage medium of claim 17, wherein the set of instructions further causes the computer to place, at a center of k-space, data corresponding to a gradient echo substantially corresponding to a null point of the suppressed tissue.